Pre-feasibility Analysis for a Cleaning and Processing Facility for Kentucky Soybeans

Prepared for the

Kentucky Soybean Promotion Board

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Prepared by

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Executive Summary

- The Kentucky Soybean Association (KSA) retained Market Solutions LLC to conduct an analysis of the market potential for soybeans for food use and a preliminary assessment of the potential for establishing a facility in Western Kentucky to clean and process non-genetically modified (non-GMO) soybeans for food use. This report presents findings of the pre-feasibility assessment. A companion report presents findings of the market analysis.
- The Kentucky Soybean Promotion Board and the Kentucky Agricultural Development Board provided funding to KSA to support this project.

Market Assessment Highlights

Domestic Market Opportunities

- With approval of the health claim for soy protein in reducing the risk of heart disease, and progress on improving the taste of soyfood products, the U.S. market for food products containing soy ingredients has been growing very rapidly. Kentucky producers looking for options to increase returns identified production and processing of non-GM soybeans for food uses as a promising alternative.
- Soy milk and other dairy substitutes, chilled and frozen meat substitutes, energy and nutrition bars and beverages are all seeing rapid growth in sales through mainstream supermarkets and restaurants around the country. Soy ingredients are also playing a bigger role in baking, meat processing and and other mainstream food production because of their nutritional, functional and economic benefits.

Executive Summary

- A growing number of soy foods manufacturers and other food processors are looking for soy ingredients. Many are looking for products that do not contain genetically modified soybeans. A number are also looking for organic ingredients as well.
- An indication that soy-based foods have become mainstream is that major food companies like Kellogg, Kraft and Dean Foods are buying into the market. In some cases they are purchasing companies and products of successful natural foods suppliers and adding product development, distribution and advertising and promotion to build the market. Numerous small and medium sized companies are also developing soy products, some aimed at local and regional markets. Almost 400 new soyfood products were introduced in 2001.
- For Kentucky soybean producers there are a variety of opportunities to participate in the market growth, including:
  - Supplying cleaned whole soybeans with specific output characteristics to domestic or international customers.
  - Adding value to these soybeans through processing, such as producing specialty soy flour or grits and oil to customer specifications.
  - Producing, marketing and distributing consumer products using Kentucky soybeans as an ingredient.

Executive Summary

- As Kentucky producer groups consider these opportunities it will be important to recognize that major commodity grain and oilseed processors are also increasing their investment in becoming soy ingredient suppliers to the soy foods industry.and the food industry in general. These investments are an indication of the growth potential.
- Growing competition makes it important for new market entrants to pursue niche opportunities that minimize head-to- head competition with large players. Among some of the opportunities with promise:
  - Adding value by producing varieties of food soybeans for tofu, natto or other uses, with varieties that are well respected for their end-use traits and a rigorous system of traceablilty, non-GMO certification and identity preservation.
  - Supplying commodity ingredients like soy flour or textured soy products, focusing on regional companies and smaller customers who appreciate the responsiveness of local suppliers;
  - Offering specialty custom runs of ingredient products that cannot be easily or economically provided by large plants;
  - Providing specialized distribution and service especially to companies that large companies are not interested in servicing;
  - Producing specialty consumer products for retail and food service, working with regional businesses that want to feature local products and/or producing products to buyer specifications that can be labeled with store or restaurant brands.
- Success will require building a team that brings together specialized management, operations and marketing/sales expertise.

Executive Summary

International Market Opportunities

- Some Kentucky soybean producers are already taking advantage of opportunities to produce non-GMO food grade soybeans for the Japan market. This is a genuine long term market opportunity. If Kentucky producers can meet the requirements of the Japan market and sell directly, there is potential for good returns. Soybean prices in Japan are often more than double U.S. prices, even higher for preferred varieties and organic production. Success in obtaining a larger share of those returns will involve added costs and risks. These must be carefully evaluated.
- Japan offers the highest end product value market for specialty food soybeans to those who can meet customer requirements and invest in building relationships for the longer term.
- Success will require production of varieties with the size, protein levels, oil content and end-product characteristics that customers are looking for. Producers will have to consider potential costs of production, harvesting, cleaning and transport, taking into account impacts on yields and the requirements to be able to certify products as non-GMO. Documentation and international payment will have to be arranged, with some negotiations likely to be in Japanese.
- It appears that Southwestern Kentucky could have some advantages in terms of transportation and long term relations between the Commonwealth of Kentucky and Japan upon which to build.

Executive Summary

Taking Advantage of Opportunities

- For any business organization or producer group interested in pursuing specific opportunities, the next step is to identify the specific market objectives that are of highest interest. This is the starting point in developing a business plan.
- The first step is to look at the varieties that can currently be grown. Whether the goal is to produce traditional non-GMO varieties for processing or specific food grade beans for tofu or natto, it is important to assess what can be produced and what additional costs are likely to be involved. What kind of return will be necessary to make it worthwhile to produce the kinds of soybeans needed for the the operation? If value is to be added by cleaning and processing, some of the return from sales will have to cover a return on the capital invested, and some will permit a higher return for the soybeans themselves.
- If the goal is to produce non-GM soybeans, the second step is to consider non-GMO certification. Traceability and independent certification that GMO content is below customer tolerances, generally 1 to 5 percent when the product arrives at destination, involves added costs as well. This begins with cleaning out planting and harvesting equipment and trucks, but requires looking at opportunities for commingling GM and non-GM products all the way to the ultimate destination. With sealed containers, this means to the exit door from the cleaning and processing plant. With bulk shipments, potential commingling continues to the point where title is transferred.

Executive Summary

- A next step is to take stock of the resources available to contribute to making a project happen. From the starting point of a person or organization with an idea, a project has to:
  - Build a team to define clear objectives for the specific project, put in place a start-up company and plans for staffing and managing the project as it proceeds.
  - Develop the business plan, including a marketing plan for the products.
  - Develop a physical plan for the operation.
  - Raise financing.
  - Build the facility.
  - Manage operations.
  - Handle marketing and sales, distribution and customer service.
  - Continue to plan for the future.
- Some of these resources are probably readily available. For others, the group will have to consider options for drawing on outside expertise. Success will require putting together and team, making decisions and investments to ensure that all are put in place.
- The balance of the summary focuses on findings of the pre-feasibility analysis.

Executive Summary

Pre-feasibility Analysis Findings

Project Concept. The concept proposed in undertaking this assignment is to build a cleaning and processing plant to handle 300,000 – 600,000 bu of soybeans annually, with a location in Simpson County, KY.

- The pre-feasibility analysis examines:
  - Current Supply and Demand Situation
  - Opportunities and Challenges as Suppliers of whole non-GMO soybeans and ingredients
  - Considerations in evaluating a cleaning, bagging and processing facility
  - Considerations in structuring a project, including potential public and private support.
  - Potential physical structure and equipment.
  - Assumptions, Potential Returns, Conclusions and Recommendations.

Supply and Demand Situation

- Soybean production in the area surrounding the proposed location is sufficient to meet the needs of such a facility. It will require about one-fourth of current non-GMO soybean production based on information provided by project sponsors. However, it will only use about 5.5 percent of current soybean production in the surrounding counties. As a result the proposed facility should not be expected to disrupt supplies for current soybean users. With a plan based on reaching full production over a five year period there should be ample opportunity for production to respond to increased demand, providing alternatives for tobacco production and opportunities to increase farm incomes in the area.

Executive Summary

Opportunities and Challenges in Supplying non-GMO soybeans and Ingredients

- Some Kentucky producers are already receiving substantial premiums by providing clear hilum varieties of food grade soybeans for export to Japan. Futures prices for non-GMO soybeans on the Kansai exchange are now about $4.00 per bushel above prices on the Chicago Board of Trade. Prices for specialty clear hilum soybeans appreciated by Japanese tofu manufacturers are substantially higher. It Kentucky producers can export directly it is important to consider the potential returns, but also the costs and risks involved.
- The market for non-GMO soybeans increasingly requires that suppliers certify purity. There are many opportunities for GM varieties to become co-mingled with non-GM products. Buyers and their customers are increasingly testing products presented as non-GMO and failure to meet required standards means financial risk for those all along the supply chain. Certification systems that trace soybeans from planting to delivery are becoming a necessity, and involve additional costs.
- Food grade soybean varieties often produce lower yields than conventional varieties, so a premium will be required to make it worthwhile to produce them. University of Kentucky trials indicate yield losses of 3 to 15 percent compared to the best performing varieties. Results of trials do not report factors like bean size, protein and oil content that affect the value of soybeans to end users.

Executive Summary

Considerations in Evaluating a Cleaning, Bagging and Processing Facility

- The annual capacity of the proposed facility is equivalent to the processing capacity over several days of some of the large, state of the art solvent extraction facilities that account for most soybean crushing in the U.S. Large plants have low per unit processing capacity, but also limited flexibility in providing specialty products that some customers require.
- Average crush margins of $1.20 per bushel, or $0.02 per lb over the last decade require high efficiency and large volumes to be profitable. To be successful, a smaller facility will have to focus on niche market opportunities which can offer substantially higher per unit margins.

Considerations in Structuring a Project

- Success will hinge on being able to produce specialty products in quantities that are large enough to permit cost-effective processing, marketing and distribution, but small enough to avoid head-to-head competition with commodity processors.
- Opportunities with soyfoods manufacturers and conventional food processors, including both national, regional and local accounts should be evaluated. The most recent U.S. census of manufacturing identified 430 companies in Kentucky and Tennessee who may be potential customers and also potential partners in pushing forward with the venture.
- Examples of experience of cooperative and investor-owned enterprises in undertaking similar ventures are provided to offer potentially useful lessons for Kentucky producers.
- Options for obtaining support from the Kentucky Agricultural Development Board and other sources are also discussed.

Executive Summary

Potential physical structure and equipment.

- The concept suggested for preliminary analysis is to have a plant capable of cleaning 600,000 bushels of soybeans annually, half as clear hilum food soybean varieties to be sold for export, and the balance to be processed into soy flour and oil or other products.
- A cleaning plant capable of handling 8-10 tons per hour would be able to process the full 600,000 bu target within 250 days of 8 hour shifts. Options for a processing plant capable of handling 4-5 tons per hour during a similar work year were also considered. As some equipment operates more efficiently when it runs continuously this means that the entire 300,000 bu target for processing could be handled in 84 days working three shifts. Some of the considerations in selecting and sizing equipment are discussed.
- Requirements for the cleaning facility will include receiving and bulk storage. For soybeans for food use, facilities often include a continuous cup elevator to minimize cracking , a primary cleaner, a de-stoner, spiral separators to remove splits, a gravity table, an electronic eye color sorter and bagging and/or container loading for whole beans.
- An extruder/expeller combination together with a hammer mill can be used to produce soy flour and grits of various sizes, and expeller soybean oil. Soybeans may be dehulled prior to processing. Depending upon a range of product and marketing decisions these products can be bagged, packaged and/or bottled to meet various customer requirements. The products can also be further processed into textured protein products, snack foods, dairy or meat substitutes, and de-gummed or refined soybean oil.

Executive Summary

Conclusions and Recommendations

- In developing a budget for a cleaning, bagging and processing enterprise on a green field site, equipment costs are often about one-third of the total budgeted cost of a project. Equipment for a new state of the art cleaning, extrusion/ expeller facility is likely to be in the $1-1.5 million range with a final project cost of $3 – 4.5 million. A project could be developed within a smaller budget, however.
- In order to estimate project costs accurately requirements for buildings, storage facilities, site work, concrete, utilities, electrical wiring, piping, duct work, permits and fees, freight and insurance for equipment and environmental controls will all have to be evaluated at a specific location.
- Cash flow projections for a potential project were developed based on a set of relatively conservative assumptions. A $3.5 million project funded with 50 percent grant funding is assumed. Product handling is assumed to begin with 100,000 bus of food soybeans and 100,000 bus of soybeans processed in the first year of operation, growing to 300,000 bus each in the fifth year.
- The combined soybean and processing operation would be expected to generate returns to Kentucky soybean producers estimated at $3.4 million annually at current prices once it reaches full capacity.

Executive Summary

- Based on very conservative product sales assumptions, once it reaches full capacity, the project would be expected to generate $3 million annually to cover operating, marketing and distribution costs, return on investment, premiums to be paid for soybeans purchased and cash flow to repay principal invested in the facility.
- During the five year period, the project would be expected to return at least $12.4 million to soybean producers in payment for soybeans and generate a total of $17 million in economic activity before multiplier effects are considered.

Organization and Management of the Venture.

- In order to move forward with the proposed venture a steering group or Board of Directors will be needed to make critical decisions. This group will:
  - Decide on clear objectives, the most likely scope of activities for the project and the organizational structure for the venture.
  - Assess human, financial and physical resources already available and assemble others needed to move the project forward.
  - Select potential sites for further consideration.
  - Arrange to develop a suggested physical plant layout, detailed equipment requirements and full feasibility analysis and business plan, including a marketing plan for the products.

Executive Summary

  - Secure investor support, grants and other financing to support the physical infrastructure and working capital.
  - Contract for the project and to oversee construction and start-up.
  - Hire management and make plans for operating and marketing staff.

- KSA members probably have significant expertise with which to address some of these issues. For others, the group should consider options to draw on outside expertise. Success will require putting together a full team and making decisions and investments to address all of the above elements.

Table of Contents

Market Solutions LLC has used its best professional effort in undertaking this assignment but assumes no liability for decisions made by those who may read this report.

The Commonwealth of Kentucky